

(19)



(11)

EP 1 765 103 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:

18.05.2011 Bulletin 2011/20

(51) Int Cl.:

A42B 3/32 (2006.01)

(21) Application number: **05757589.6**

(86) International application number:

PCT/NZ2005/000108

(22) Date of filing: **01.06.2005**

(87) International publication number:

WO 2005/120265 (22.12.2005 Gazette 2005/51)

(54) **PROTECTIVE HELMETS**

SCHUTZHELME

CASQUES DE PROTECTION

(84) Designated Contracting States:

**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU MC NL PL PT RO SE SI SK TR**

Designated Extension States:

HR

(30) Priority: **09.06.2004 NZ 53349204**

20.04.2005 NZ 53958705

(43) Date of publication of application:

28.03.2007 Bulletin 2007/13

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Description

TECHNICAL FIELD

[0001] This invention relates to protective helmets such as those used by firemen.

BACKGROUND

[0002] The nature of fire fighting and rescue operations is such that risks of injury and death to emergency service crews can vary from incident to incident. Currently helmets need to be interexchanged.

[0003] EP-A-1670329 describes a firefighter's helmet comprising an inner protective shell configured to be worn on its own as a helmet and an outer protective shell configured to be fitted over the inner shell and releasably retained thereon.

BRIEF DESCRIPTION OF THE INVENTION

[0004] This invention relates to a safety helmet system (in a preferred instance but not limited to a fire fighting/rescue helmet design) which incorporates multiple layers of key components and structures into one helmet in such a manner that from a basic level of head protection, other higher levels of protection can be added without first removing the basic level.

[0005] A modular head protection system of the present invention has been designed in such a way that layers of protection can be added in single, or multiple configurations to provide levels of protection appropriate to changing environments.

[0006] By proper wearing of this helmet system, injuries likely to result from impacts (either from falling objects or falling over), sharp objects (penetration), flame and heat exposure, liquid or chemical splash, molten metals and other hot fluids, electrical discharges, electrocution, or radiation and UV are eliminated or at least substantially reduced. In particular, a major cause of head injury to emergency services crews arises from road accidents when the vehicles they are travelling in are involved in accidents. These are comparatively common events as fire appliances and ambulances are large heavy vehicles and when travelling at speed to attend a call out, are vulnerable to over-turning and collisions. All the evidence is that personnel in these vehicles should be wearing a light protective safety helmet.

[0007] Until now, many of the individual and separate items of safety equipment used by fire and rescue workers for different levels of risk have been developed as individual products, designed and manufactured to different Standards and performing to different physical tests. In some instances these individual and unrelated international safety Standards are increasingly becoming more closely related, but until now have required separate safety helmets to comply with the technical requirements of each Standard.

[0008] This invention in preferred forms provides a level of head protection, which not only integrates what previously was a multitude of helmets designed for different types of threats, but also widens the range of risks for which protection is provided.

[0009] The development of fire and rescue crew safety equipment has frequently been both uncoordinated and subject to the specialties and product whims of individual manufacturers. The result has been that as new technology tools arrive in the market place, these have simply been added to the list of equipment physically worn by the crews, adding weight and complexity to the fire or rescue environment. Furthermore, many of these devices were never designed to be fully compatible with each other, resulting in interface problems, duplication of function and unnecessary weight.

[0010] One intention of this design is to provide for the incorporation of a range of safety equipment used by fire and rescue workers into one integrated design, which avoids duplications while ensuring a complete lightweight safety helmet.

[0011] In addition, this invention adds new features, technologies and designs for some subcomponents, and, by using a series of laminated semi-rigid materials, a lower specification safety helmets can be metamorphosed into a higher-level helmet with obsolescing any the basic components.

[0012] The present invention is as defined in and by the appended claims.

[0013] The present invention provides a protective helmet assembly having a protective shell with a head cradle system as wearable head support therefor, a detachable second shell as a helmet component, the detachable second shell carried directly or indirectly by the protective shell, where this second shell helmet component is more expansive in skirting down alongside and/or behind the head of a wearer than the protective shell, characterized in that the assembly comprises a detachable third shell as a further helmet component, where the detachable third shell is nested by the detachable second shell.

[0014] In the following description, the protective shell is referred to as the "Level 1" shell or helmet or shell helmet, the second shell is referred to as the "Level 2" shell or component, and the third shell is referred to as the "Level 3" shell or component.

[0015] The Level 2 shell, as an additional shell, at least nests or detachably nests the Level 1 shell.

[0016] The Level 2 shell at least in part nests or detachably nests a Level 3 shell.

[0017] Preferably there is a visor carried by the Level 2 shell or between the Level 1 and Level 2 shells or between Level 2 and 3 shells.

[0018] Optionally the shells have a fireman's comb or central ridge as a design feature.

[0019] The helmet assembly of the present invention may provide a multi-purpose fire/rescue/or other protective helmet incorporating a single shell to which can be added at least one additional shell or additional shells for

higher level or higher levels of protection.

[0020] This first ("single") shell is referred to hereafter as the basic Level 1 shell.

[0021] The helmet assembly of the present invention can be provided in combination or as a kit.

[0022] The kit may comprise (a) the helmet ("Level 1 helmet") securable to the head of an intended user thereby to provide with its shell or equivalent at least some measure of impact protection to such user, and at least (b) the detachable second shell as a helmet component ("Level 2 component") to be associated with the Level 1 helmet thereby to provide (i) enhanced impact protection to said intended user beyond that of the Level 1 helmet alone, and/or (ii) a more downwardly depending skirt than any of the Level 1 helmet, and/or (iii) a visor for said intended user. These (a) and (b) kit components may be provided in combination. The detachable third shell as the further helmet component according to the present invention is nested by the detachable second shell to provide the protective helmet assembly for use.

[0023] The kit may comprise (a) the helmet ("Level 1 helmet") securable to the head of an intended user thereby to provide with its shell or equivalent at least some measure of impact protection to such user, and at least: (b) the detachable second shell as a helmet component ("Level 2 component") to be associated with the Level 1 helmet thereby to provide (i) enhanced impact protection to said intended user beyond that of the Level 1 helmet alone, and/or (ii) a more downwardly depending skirt than any of the Level 1 helmet, and/or (iii) the said skirt will extend downwards at least on both sides of the helmet, or perhaps cover the entire Level 1 shell, and/or (iv) a skirt or skirts that extend down both sides of the Level 1 shell, connected from one side to the other by a section of the Level 2 shell (e.g. just extending around the lower extremities and below if necessary - Refer Fig.9), and/or (v) a face shield/visor/eye protector for said intended user, and/or (vi) a face shield/visor/eye protector that attach to the Level 2 shell rather than to the Level 1 helmet, being affixed to the Level 2 shell either internally (between the Level 1 and 2 shells) or externally on the outside of the Level 2 shell (e.g. see Refer Fig. 10). These (a) and (b) kit components may be provided in combination. The detachable third shell as the further helmet component according to the present invention is nested by the detachable second shell to provide the protective helmet assembly for use.

[0024] In a preferred form of the invention skirt or skirts of the Level 2 helmet will normally extend downwards at least on both sides of the helmet, or perhaps cover the entire Level 1 shell. Alternatively, the said skirt or skirts may extend down both sides of the Level 1 shell, and be connected from one side to the other by a section of the Level 2 shell just extending around the lower extremities (and below if necessary). Refer Fig.9.

[0025] In a preferred form the Level 2 helmet has a face shield/visor/eye protector for said intended user that attach to the Level 2 shell rather than to a Level 1 helmet.

These items of face and eye protection may be affixed to the Level 2 shell either internally (between the Level 1 and 2 shells) or externally on the outside of the Level 2 shell (Refer Fig. 10).

[0026] A Level 3 component is to be associated with the Level 1 helmet and the Level 2 component. Instead of one Level 2 component, there could be several different Level 2 component versions each with features providing different mixes of capabilities.

[0027] The traditional design shapes and wearing position (on the head) of fire and other helmets for emergency services have, over the last century, exhibited great changes, but two primary distinctive characteristics have remained. These are the traditional comb line across and down the centre of the upper shell, and the fact that helmets have generally only covered the area of the wearers head above the reference plane line (i.e. approximately the ear opening) but also excluding the face.

[0028] This new design need not be limited to one particular shape of helmet or its styling or the area of head protected. Incorporated in the basic Level 1 shell is that component or are those components that permit the basic helmet to be retained on the wearer's head (i.e. chin strap, cradle system, headband, size adjustment system, etc.). These features can be all considered as "wearable head support" for the Level 1 shell or helmet. In addition, fitted to this shell is or can be a special energy absorbing liner that provides impact, penetration, thermal and radiation protection greater and over a wider area than impact cradles or ribbon systems. This impact protection is especially valuable in vehicle accidents and falling from heights.

[0029] The Level 1 helmet is preferably designed to provide protection for those types of rescue and fire fighting commonly known as bushfire, RTA (road transport accident), USAR (urban search and rescue/ civilian rescue operations) MEDIVAC (medical rescue and evacuations) etc, where the risk of serious impacts or high risk fire and/or thermal threats are relatively low. To these common low level fire and rescue threats, the helmet preferably specifically adds protection from head injuries in the event of accidents involving emergency services vehicles.

[0030] Because this Level 1 helmet is designed to fit with at least one other and preferably a multiplicity of additional protective levels, it is possible that some of the optional components that might normally be attached to this type of helmet, will become absorbed within the higher levels or impediments to the attachment of higher levels of protection. These optional components could include helmet mounted hands- free torches, face shields, reflective markings and other accessories.

[0031] Where necessary, provision needs to be made to attach some of these optional components either internally in the Level 1 helmets, or to replicate their function in the Level 2 or higher Level components.

[0032] Because the Level 1 helmet provides only a ba-

sic level protection, the addition of a second shell with further energy and penetration resistance is necessary for most types of structural fire fighting, military fire and rescue and other high risk rescue operations.

[0033] Normally safety helmets designed for these operations are separate helmets. The specific feature of this design is the fact that the Level 1 helmet can be upgraded momentarily by the addition of the Level 2 shell. The Level 2 shell and impact system is specifically designed to be used and fitted to the Level 1 helmet, and cannot normally provide designed levels of protection to the wearer without combination with the Level 1 helmet.

[0034] Previously, a structural fire helmet or similar helmets used by other emergency services have required that the design of the helmet be specifically intended for this purpose. This claim specifically relates to a design of helmet with a plurality of both shell and impact/thermal protection system, designed in a modular fashion where the addition of levels of protection are built upon each other with the need to discard or remove the first level of helmets before wearing the second or subsequent levels. Such additional items of protection may be described as additional Levels or clipped-on components that supplement the original base helmet.

[0035] Dependent upon the requirements of the Standard, and the operational requirements of the Service itself, attachments and other components can be provided including the Level 2 shell to provide face protection (face shields etc.) lighting, (hands-free torch or flashlight), rank markings, reflective trims etc.

[0036] The addition of further levels of protection is dependant on the circumstances of the emergency call-out. Once again, the principle is that additional protection can be added to the basic helmet without the requirement to discard earlier protective components. Not only is the wearer able to retain the lower levels of helmet on their head at all times, but the additional levels of protection can be selected or even discarded as the scene changes or evolves.

[0037] These third and subsequent levels of protection principally come about by the need for extremely high temperature fire fighting, or chemical or biological threats. Not infrequently, these risks are associated with training for these types of events, and the third and subsequent materials are destroyed, but the Level 1 and Level 2 components are protected from unnecessary damage.

[0038] The present invention therefore makes use of a Level 1 shell helmet suitable for use in a combination or a kit for preparing the protective shell assembly of the present invention.

[0039] The present invention also makes use of a Level 2 component suitable for association with a Level 1 shell helmet, said Level 2 component and/or Level 1 shell helmet being, for example, substantially as herein described with or without reference to any one or more of the accompanying drawings.

[0040] The present invention also makes use of a Level

3 component for association with both a Level 1 shell helmet and Level 2 component of the present invention, for example substantially as herein described with reference to any one or more of the accompanying drawings.

[0041] The present invention enables a helmet system enabling tuning, by choice of component association (directly or indirectly) with a base helmet, the level of protection to be afforded.

[0042] At least one component is a Level 1 shell helmet for use in the assembly of the present invention.

[0043] A further component is a Level 2 component for use in accordance with the present invention.

[0044] A further component is a Level 3 component for use in accordance with the present invention.

[0045] In yet a further aspect the present invention consists in the use of a helmet assembly, a helmet system or helmet components or a combination or kit of the present invention so as to provide for different levels of protection.

[0046] As used herein the term "and/or" means "and" or "or", or both.

[0047] As used herein the term "(s)" following a noun includes, as might be appropriate, the singular or plural forms of that noun.

[0048] As used herein the term "shield/visor/eye protector" includes any form of protection preferably still allowing vision.

BRIEF DESCRIPTION OF THE DRAWINGS

[0049] A preferred form of the present invention will now be described with reference to the accompanying drawings in which

Figure 1 shows as an exploded view a user wearing a Level 1 shell component helmet of an Australian/New Zealand/North American-USA type in accordance with the present invention and having (in exploded view) sequentially thereover a Level 2 shell component and thereover a Level 3 shell component, the Level 2 component being shown with a visor whilst the Level 3 component is shown with expansive shroud,

Figure 2 shows the Level 1 shell helmet in use,

Figure 3 shows the combination of the assembly of the Level 1 shell helmet of Figure 2 in use with the Level 2 component,

Figure 4 shows the use of all of the components as an assembly as shown in Figure 1, Level 3 component nesting on the Level 2 component in turn which nests on the Level 1 shell helmet,

Figures 5 through 8 correspond to those of Figures 1 through 4 but in respect of European style helmet assembly as opposed to that depicted in Figures 1

through 4 more appropriate for use in New Zealand, Australia, and North American-USA,

Figure 9 shows the design of a Level 2 shell whereby the said skirts extend downwards at the sides of the Level 1 helmets, may be joined and connected by the lower ring of the Level 2 shell extending around the brim of the Level 1 shell, in this instance rearwards, (but not exclusively) wherein the ring could extend either forward or backwards, or both,

Figure 10 shows the affixing of a face shield/eye protector/visor accessories in such a way that the means of securing and hinging/rotating these components is by way of attachment to the Level 2 shell, and

Figure 11 shows Level 2 shell of Figures 9 and 10 from below showing the visor engaged thereto so as to guidably be pivoted therefrom and able to assume a number of pull down positions.

DETAILED DESCRIPTION OF THE INVENTION

[0050] In the preferred form of the present invention the design considerations taken into account have been those previously discussed. The protective helmet assembly has a protective shell 1 with a head cradle system as wearable head support therefor, 2, 7, a detachable second shell 8 as a helmet component, the detachable second shell carried directly or indirectly by the protective shell 1, where this second shell helmet component is more expansive in skirting 11 down alongside and/or behind the head of a wearer than the protective shell, characterized in that the assembly comprises a detachable third shell 9 as a further helmet component, where the detachable third shell is nested by the detachable second shell 8.

[0051] Turning specifically to Figure 2 it can be seen that a first shell 1 (e.g. of a composite reinforced with fibreglass or Aramid materials or alternatively plastic injected external materials) is supported on a head cradle system (as a wearable support for the shell 1) which includes a size adjustment and impact protection materials. This is held to the wearer's face by appropriate harness and chin strap arrangements 2, etc. The shell 1 carries a unitary or fabricated skirt extension 11.

[0052] Figure 3 shows a Level 2 shell 8 with visor 10 preferably detachably nesting over part of the Level 1 shell 1. Figure 4 shows a Level 3 shell 9 with still more expansive skirts 12 nesting over the Level 2 shell 8.

[0053] Figures 9 to 11 show a level 2 shell 3 with a visor 4 pivoted at 5 and guided by the friction slide arrangement 6. The arrangement is as previously described.

[0054] Any appropriate engagement (preferably not requiring tools) can be used to hold components in any desired nested arrangement (e.g. spring loaded clipping)

so as not to allow dislodging without real effort. Whilst the different levels preferably serially nest, any appropriate retention interengagement can be used to provide detachable nesting. This includes one or more of toggle, VELCRO, clip fit and other interengagements.

Claims

1. A protective helmet assembly having a protective shell (1) with a head cradle system as wearable head support therefore (2, 7), a detachable second shell (8) as a helmet component, the detachable second shell carried directly or indirectly by the protective shell (1), where this second shell helmet component is more expansive in skirting (11) down alongside and/or behind the head of a wearer than the protective shell (1), **characterized in that** the assembly comprises a detachable third shell (9) as a further helmet component, where the detachable third shell is nested by the detachable second shell (8).
2. An assembly of claim 1 wherein there is a visor (10) carried by the detachable second shell (8) or between the protective shell (1) and the detachable second shell (8), or between the detachable second shell (8) and the detachable third shell (9).
3. An assembly of claim 1 or 2 wherein the shells have a fireman's comb or central ridge as a design feature.
4. An assembly of any one of the preceding claims, wherein the components are provided in combination.
5. An assembly of any one of claims 1 to 3, wherein the components are provided as a kit.
6. An assembly of any one of the preceding claims, wherein
 - (a) the protective shell (1) is securable to the head of an intended user thereby to provide with its shell or equivalent at least some measure of impact protection to such user, and
 - (b) the detachable second shell (8) is able to be associated with the protective shell (1) thereby to provide
 - (i) enhanced impact protection to said intended user beyond that of the protective shell (1) alone, and/or
 - (ii) a more downwardly depending skirt (11) than any of the protective shell (1), and/or
 - (iii) a visor (10) for said intended user.
7. An assembly of any one of the preceding claims, wherein

- (a) the protective shell (1) is securable to the head of an intended user thereby to provide with its shell or equivalent at least some measure of impact protection to such user,
- (b) the detachable second shell (8) is able to be associated with the protective shell (1) thereby to provide
- (i) enhanced impact protection to said intended user beyond that of the protective shell (1) alone, and/or
- (ii) a more downwardly depending skirt (11) than any of the protective shell (1), and/or
- (iii) a skirt (11) that will extend downwards at least on both sides of the protective shell (1) and/or cover, at least substantially, the entire protective shell (1), and/or
- (iv) a skirt or skirts (11) that extend down both sides of the protective shell (1), connected from one side to the other by part of the detachable second shell (8) component, and/or
- (v) a face shield/visor/eye protector (10) for said intended user, and
- (c) a face shield/visor/eye protector attaches to the detachable second shell component (8) or its shell rather than to the protective shell (1).
8. An assembly of claim 6 or 7, wherein the detachable third shell (9) component is associated directly or indirectly with the protective shell (1) and the detachable second shell (8) component.
9. An assembly of claim 6 or 7, wherein there are at least two detachable second shell (8) component versions.
10. Use of helmet components defined in any one of the preceding claims to provide for different levels of protection dependant on the circumstances, according to the principle that additional protection can be added to the protective shell by the detachable shell components without the requirement to discard earlier protective components.

Patentansprüche

1. Schutzhelmbaugruppe mit einer Schutzschale (1) mit einem Kopfgestellsystem als tragbare Kopfhaltung dafür (2, 7), eine entfernbare zweite Schale (8) als Helmkomponente, wobei die entfernbare zweite Schale direkt oder indirekt von der Schutzschale (1) getragen wird, wobei die zweite Schalenkomponente des Helms ausgedehnter ist, indem sie nach unten schurzförmig herumgeht (11), und zwar entlang und/oder hinter dem Kopf eines Trägers,

weiter als die Schutzschale (1), **dadurch gekennzeichnet, dass** die Baugruppe eine entfernbare dritte Schale (9) als weitere Helmkomponente aufweist, wobei die entfernbare dritte Schale in bzw. mit der entfernbaren zweiten Schale (8) verschachtelt ist.

2. Baugruppe nach Anspruch 1, wobei ein von der entfernbaren zweiten Schale (8) oder zwischen der Schutzschale (1) und der entfernbaren zweiten Schale (8), oder zwischen der entfernbaren zweiten Schale (8) und der entfernbaren dritten Schale (9) getragenes Visier (10) vorhanden ist.
3. Baugruppe nach Anspruch 1 oder 2, wobei die Schalen einen Feuerwehrhelmkamm oder zentralen Grat als Konstruktionsmerkmal aufweisen.
4. Baugruppe nach einem der vorangehenden Ansprüche, wobei die Komponenten in Kombination vorgesehen sind.
5. Baugruppe nach einem der Ansprüche 1 bis 3, wobei die Komponenten als ein Satz vorgesehen sind.
6. Baugruppe nach einem der vorangehenden Ansprüche, wobei

(a) die Schutzschale (1) an dem Kopf eines vorgesehenen Benutzers befestigbar ist, um **dadurch** mit ihrer Schale oder Gleichwertigem zumindest in gewissem Maße einen Prallschutz für den Benutzer bereitzustellen, und

(b) die entfernbare zweite Schale (8) mit der Schutzschale (1) verbindbar ist, um **dadurch** Folgendes bereitzustellen

(i) erhöhten Prallschutz für den vorgesehenen Benutzer über denjenigen der Schutzschale (1) alleine hinaus, und/oder

(ii) einen Schurz (11), der mehr nach unten hängt als jeder Teil der Schutzschale (1), und/oder

(iii) ein Visier (10) für den vorgesehenen Benutzer.

7. Baugruppe nach einem der vorangehenden Ansprüche, wobei

(a) die Schutzschale (1) an dem Kopf eines vorgesehenen Benutzers befestigbar ist, um **dadurch** mit ihrer Schale oder Gleichwertigem zumindest in gewissem Maße einen Prallschutz für den Benutzer bereitzustellen, und

(b) die entfernbare zweite Schale (8) mit der Schutzschale (1) verbindbar ist, um **dadurch** Folgendes bereitzustellen

(i) erhöhten Prallschutz für den vorgesehenen

- nen Benutzer über denjenigen der Schutzschale (1) alleine hinaus, und/oder
(ii) einen Schurz (11), der mehr nach unten hängt als jeder Teil der Schutzschale (1), und/oder
(iii) einen Schurz (11), der sich mindestens von beiden Seiten der Schutzschale (1) nach unten erstreckt, und/oder mindestens im Wesentlichen teilweise die gesamte Schutzschale (1) abdeckt, und/oder
(iv) ein Schurz oder Schurze (11), die sich beiderseits der Schutzschale (1) nach unten erstrecken, die von einer Seite zur anderen durch einen Teil der Komponente der entfernbaren zweiten Schale (8) verbunden sind, und/oder
(v) ein Gesichtsschutz/Visier/Augenschutz (10) für den vorgesehenen Benutzer, und
- (c) ein Gesichtsschutz/Visier/Augenschutz, der eher an der Komponente der entfernbaren Schale (8) oder ihrer Schale als an der Schutzschale (1) befestigt ist.
8. Baugruppe nach Anspruch 6 oder 7, wobei die Komponente der entfernbaren dritten Schale (9) direkt oder indirekt mit der Schutzschale (1) und der Komponente der entfernbaren zweiten Schale (8) verbunden ist.
9. Baugruppe nach Anspruch 6 oder 7, wobei mindestens zwei Komponentenversionen der entfernbaren zweiten Schale (8) vorhanden sind.
10. Verwendung der in einem der vorangehenden Ansprüche definierten Helmkomponenten zur Bereitstellung unterschiedlicher Schutzniveaus in Abhängigkeit von den Umständen nach dem Prinzip, dass der Schutzschale ein zusätzlicher Schutz durch die entfernbaren Schalenkomponenten hinzugefügt werden kann, ohne dass das Ablegen früherer Schutzkomponenten erforderlich ist.
- Revendications**
1. Ensemble de casque protecteur ayant une coque protectrice (1) avec un système de berceau pour la tête en tant que support de la tête (2, 7) pouvant être porte, une deuxième coque détachable (8) en tant que composant du casque, la deuxième coque détachable étant portée directement ou indirectement par la coque protectrice (1), ce deuxième composant de casque s'étendant vers le bas par une jupe (11) le long et/ou derrière la tête d'un utilisateur d'avantage par rapport à la coque protectrice (1), **caractérisé en ce que** l'ensemble comprend une troisième coque détachable (9) en tant que composant supplémentaire du casque, la troisième coque détachable étant reçue par emboîtement par la deuxième coque détachable (8).
2. Ensemble selon la revendication 1, dans lequel une visière (10) est portée par la deuxième coque détachable (8) ou entre la coque protectrice (1) et la deuxième coque détachable (8), ou entre la deuxième coque détachable (8) et la troisième coque détachable (9).
3. Ensemble selon la revendication 1 ou 2, dans lequel les coques ont une crête de casque ou une arête centrale à titre de caractéristique de conception.
4. Ensemble selon l'une quelconque des revendications précédentes, dans lequel les composants sont fournis en combinaison.
5. Ensemble selon l'une quelconque des revendications 1 à 3, dans lequel les composants sont fournis sous forme de kit.
6. Ensemble selon l'une quelconque des revendications précédentes, dans lequel :
- (a) la coque protectrice (1) peut être fixée à la tête d'un utilisateur prévu pour ainsi assurer avec sa coque ou équivalent, au moins un certain degré de protection de cet utilisateur contre les impacts, et
(b) la deuxième coque détachable (8) peut être associée à la coque protectrice (1) pour ainsi fournir
- (i) une protection améliorée dudit utilisateur contre les impacts, en plus de celle assurée par la coque protectrice (1) seule, et/ou
(ii) une jupe descendant vers le bas (11) par rapport à toute partie de la coque protectrice (1), et/ou
(iii) une visière (10) pour ledit utilisateur prévu.
7. Ensemble selon l'une quelconque des revendications précédentes, dans lequel
- (a) la coque protectrice (1) peut être fixée à la tête d'un utilisateur prévu pour ainsi assurer avec sa coque ou équivalent, au moins un certain degré de protection de cet utilisateur contre les impacts,
(b) la deuxième coque détachable (8) peut être associée à la coque protectrice (1) pour ainsi fournir
- (i) une protection améliorée dudit utilisateur contre les impacts, en plus de celle assurée

par la coque protectrice (1) seule, et/ou
(ii) une jupe descendant vers le bas (11) par rapport à toute partie de la coque protectrice (1), et/ou
(iii) une jupe (11) qui s'étendra vers le bas au moins des deux côtés de la coque protectrice (1) et/ou couvrira, au moins substantiellement, toute la coque protectrice (1), et/ou
(iv) une jupe ou des jupes (11) qui s'étendent vers le bas des deux côtés de la coque protectrice (1), connectées d'un côté à l'autre par une partie du composant de la deuxième coque détachable (8), et/ou
(v) un protège visage, une visière ou un protège yeux (10) pour ledit utilisateur prévu, et

(c) le protège visage, la visière ou le protège yeux s'attache au composant de la deuxième coque détachable (8) ou sa coque plutôt qu'à la coque protectrice (1).

8. Ensemble selon la revendication 6 ou 7, dans lequel le composant de la troisième coque détachable (9) est associé directement ou indirectement à la coque protectrice (1) et au composant de la deuxième coque détachable (8).
9. Ensemble selon la revendication 6 ou 7, dans lequel il y a au moins deux versions de composants de la deuxième coque détachable (8).
10. Utilisation de composants de casques définis dans l'une quelconque des revendications précédentes, pour fournir différents niveaux de protection en fonction des circonstances, selon le principe qu'une protection supplémentaire peut être ajoutée à la coque protectrice par les composants de coque détachable sans devoir jeter les composants protecteurs précédents.

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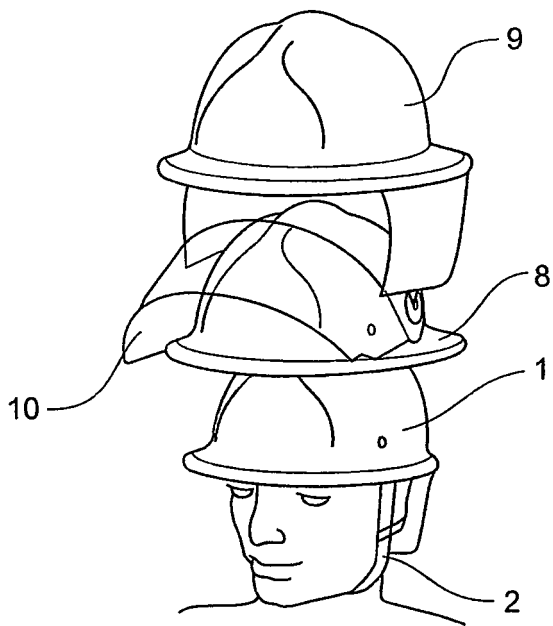


FIGURE 1

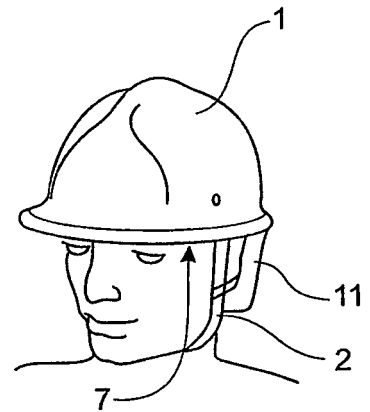


FIGURE 2

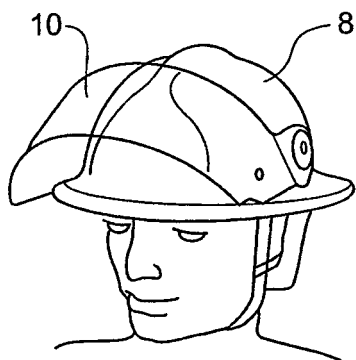


FIGURE 3

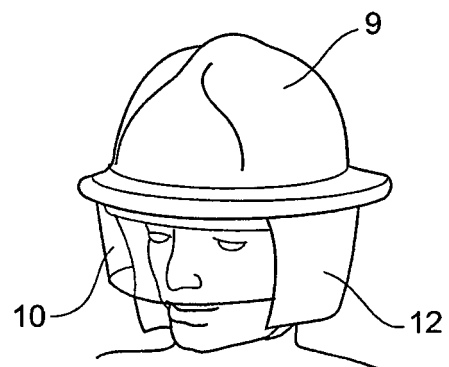


FIGURE 4

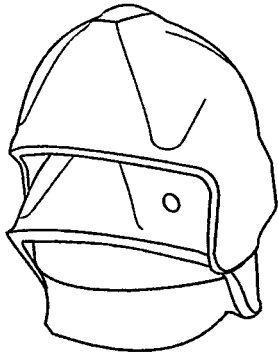


FIGURE 5

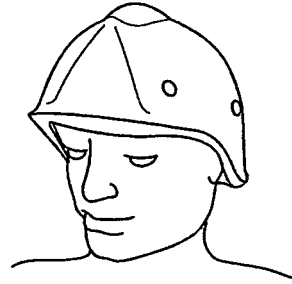


FIGURE 6

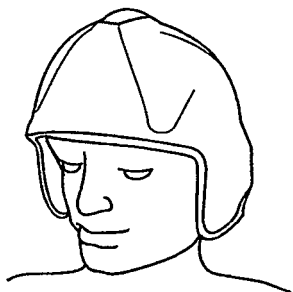


FIGURE 7



FIGURE 8

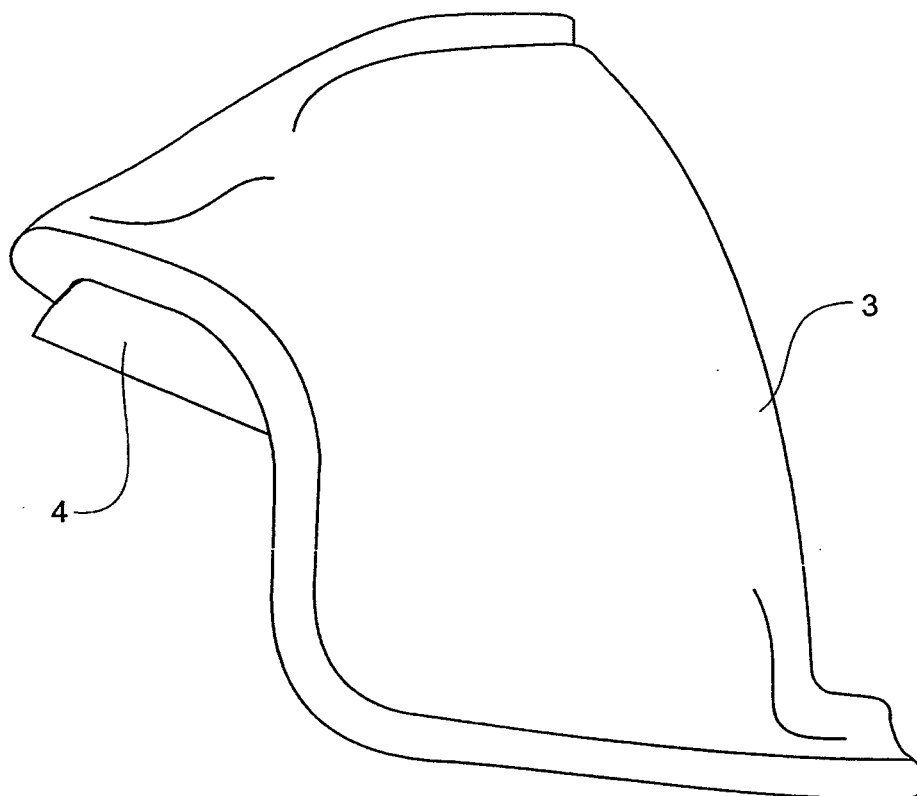


FIGURE 9

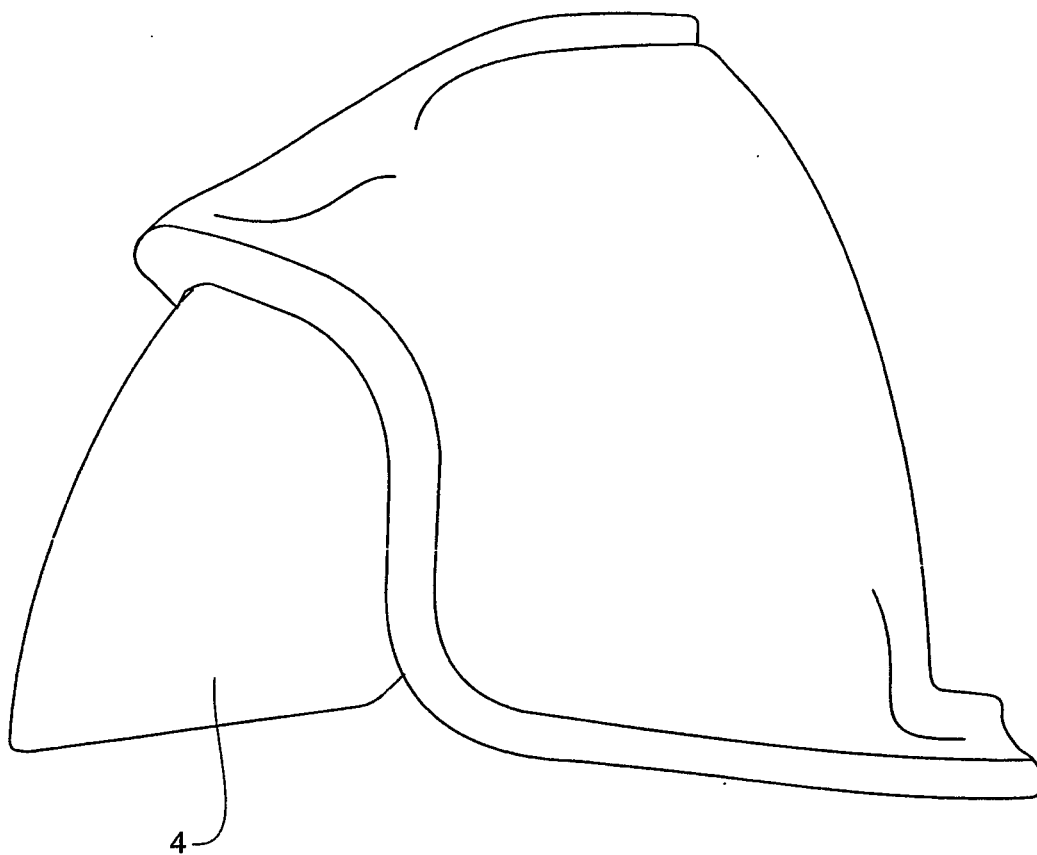


FIGURE 10

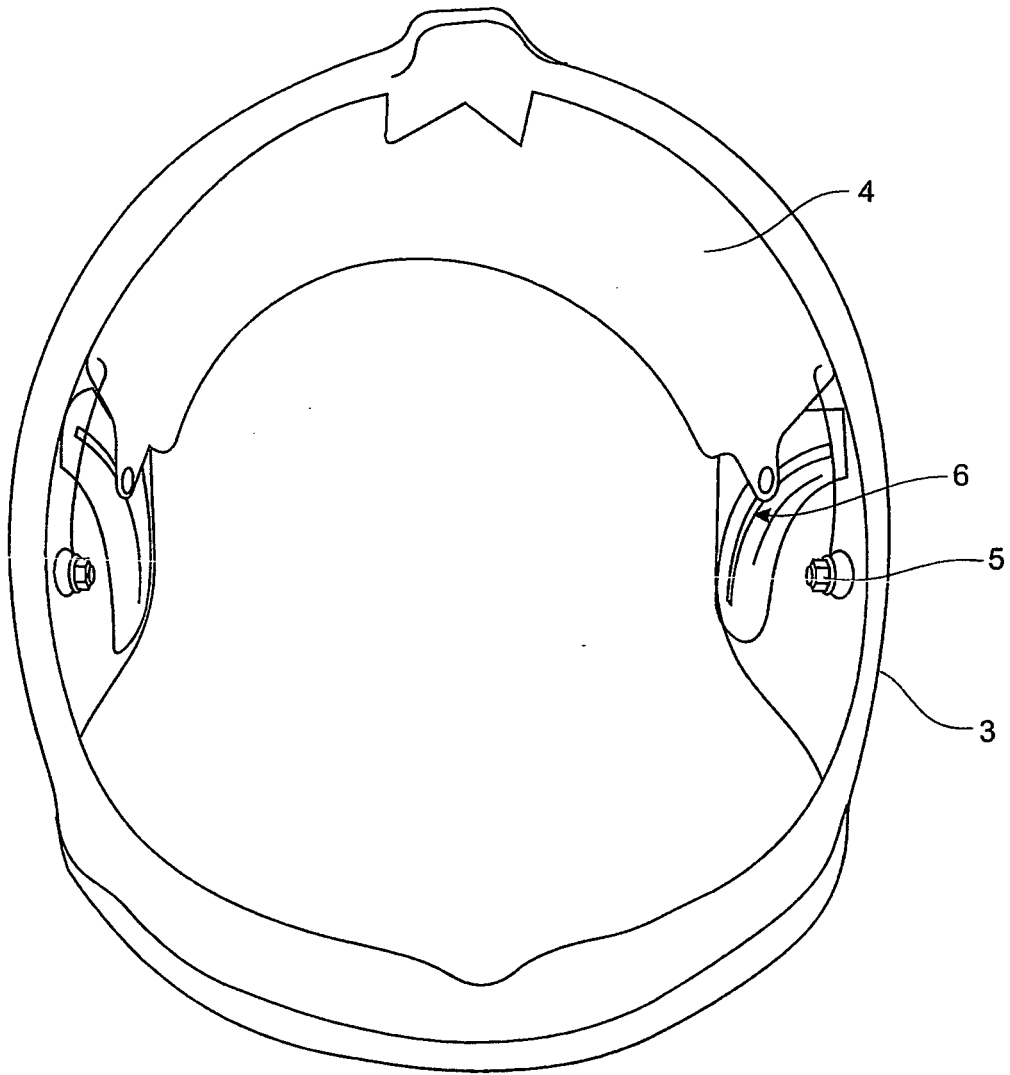


FIGURE 11

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1670329 A [0003]